#2 on Last Quiz w/ Divergence

AM: $\nabla \cdot \vec{F} = \nabla \cdot \langle y, -x, 2z \rangle = 0 + 0 + 2 = 2,$

so $\displaystyle\oiint_{S_{\text{closed hemisphere}}} \vec{F} \cdot \vec{dS} = \iiint_{V_{\text{hemisphere}}} 2\, dV$ $\left(= \cancel{2} \cdot \tfrac{1}{\cancel{2}} \cdot \tfrac{4\pi R^3}{3} = 32\pi/3 \right.$ ($R=2$) would finish $\left.\right)$

$$= 2 \int_{\rho=0}^{2} \int_{\theta=0}^{2\pi} \int_{\phi=0}^{\pi/2} \rho^2 \sin\phi \, d\phi \, d\theta \, d\rho$$

$$= 4\pi \cdot \left(\frac{\rho^3}{3} \Big|_0^2 \right) \cdot \left(-\cos\phi \Big|_0^{\pi/2} \right) = 4\pi \cdot \frac{8}{3} \cdot (-0+1) = \boxed{\frac{32\pi}{3}}$$

PM: $\nabla \cdot \vec{F} = \nabla \cdot \langle 0, y, -z \rangle = 0 + 1 - 1 = 0,$

so $\displaystyle\oiint_{S} \vec{F} \cdot \vec{dS} = \iiint_{V_{\text{enclosed}}} 0\, dV = \boxed{0}$

[Since it's so easy, I graded extremely harshly, especially for the afternoon]